Do PCBs Smell? The Use of Detection Dogs to Locate PCB Hotspots

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Background/Objectives. This pilot study evaluating the ability of dogs to detect elevated polychlorinated biphenyl (PCB) concentrations was conducted to support Seattle Public Utilities' (SPU's) ongoing source control efforts in the Lower Duwamish Waterway (LDW). The LDW was listed as a Superfund site in 2001 by the US Environmental Protection Agency (EPA) due to the presence of elevated levels of PCBs and other contaminants in LDW sediment. PCBs have been commonly detected in solids samples collected from within City of Seattle's drainage system, although generally at concentrations that are low relative to the action level for LDW sediment. While SPU has in some cases been able to identify specific sources of PCBs, it is often difficult to associate a specific source with the concentrations detected in the drainage system. Dogs (*Canis familiaris*) are able to distinguish among a variety of scents, an ability that makes them uniquely suited for a wide range of activities, including search and rescue, tracking, and biological applications (e.g., searching for animal scat or invasive weeds). Using dogs to identify sources of PCBs or confirm their absence would allow for a more efficient, cost-effective, and thorough search for potential sources of PCBs on properties within the LDW drainage basin.

Approach/Activities. Using a grant from the Washington State Department of Ecology, SPU, Windward Environmental LLC, and the University of Washington Center for Conservation Biology's Conservation Canines (CK9) program, conducted a study to 1) evaluate whether a dog could be trained to detect PCBs at meaningful levels for source control, and 2) determine the potential utility of using a detection dog in source control efforts. First, an experienced handler from CK9 worked with Sampson—a 12-year-old black lab that is highly experienced in the detection of a variety of targets—and successfully trained him to detect PCBs. After initial training had been completed, a phased testing approach was developed to evaluate Sampson's ability to detect PCBs in successively more realistic and difficult conditions. Phase 1 involved controlled field tests at a "clean" industrial site with introduced media containing PCBs; Phase 2 involved field tests at both well-characterized industrial sites where PCBs were known to be present and at less-well-characterized sites where questions about the presence of PCBs have been raised. Throughout the three-month phased testing period, refresher training was conducted with Sampson as needed.

Results/Lessons Learned. Sampson was successful at detecting PCBs. During the Phase 1 controlled testing, Sampson correctly identified PCB-spiked soil and sand (concentrations of either 1,000 or 100 μg/kg dry weight [dw]) on his first or second pass in 92% of the 96 trials. Phase 2 field testing further confirmed this ability: Sampson correctly identified PCBs in a variety of materials, including paint chips, caulk, and dirt. However, it is important to recognize some of the challenges and key lessons learned, including 1) confidence of the detection dog team in identifying PCBs is critical, 2) the detection of an invisible target such as PCBs has unique challenges because of the inability to provide an immediate reward, 3) detection work during windy conditions should be avoided, and 4) identification of sources and hotspots is the best use of detection dogs. This work indicates that when applied appropriately, detection dogs could be useful in efficiently locating PCBs (and perhaps other contaminants) as part of future source control efforts.[ADDIN EN.REFLIST]